CLAIMS

What is claimed is:

1. A passive obstacle detection system comprising:

an infrared imaging system that acquires images;

a software system that processes images acquired by the infrared imaging system; and

a crew interface that displays the images processed by the software system,

wherein the software system further comprises cellular automata routines that propagate pixels along a line according to a set of local rules, thereby producing line segments that are linked and presented on the crew interface as obstacles.

2. The passive obstacle detection system of Claim 1, wherein the software system further comprises a function to generate a field of direction vectors.

3. The passive obstacle detection system of Claim 2, wherein the function to generate a field of direction vectors further comprises partial directional derivatives of pixels within the images.

4. The passive obstacle detection system of Claim 2, wherein the function to generate a field of direction vectors further comprises a vertical mask and a horizontal mask to form a magnitude image.

5. The passive obstacle detection system of Claim 2, wherein the function to generate a field of direction vectors further comprises pseudo colors that are indicative of direction.

6. The passive obstacle detection system of Claim 1, wherein the cellular automata routines further comprise a Game of Life model.

7. The passive obstacle detection system of Claim 1, wherein the line segments are of a sub-pixel resolution.

8. A passive obstacle detection system comprising:

an infrared imaging system that acquires images; and

a software system that processes images acquired by the infrared imaging system;

wherein the software system further comprises cellular automata routines that propagate pixels along a line according to a set of local rules, thereby producing line segments that are linked and determined to be obstacles.

9. The passive obstacle detection system of Claim 8, wherein the software system further comprises a function to generate a field of direction vectors.

10. The passive obstacle detection system of Claim 9, wherein the function to generate a field of direction vectors further comprises partial directional derivatives of pixels within the images.

11. The passive obstacle detection system of Claim 9, wherein the function to generate a field of direction vectors further comprises a vertical mask and a horizontal mask to form a magnitude image.

12. The passive obstacle detection system of Claim 9, wherein the function to generate a field of direction vectors further comprises pseudo colors that are indicative of direction.

13. The passive obstacle detection system of Claim 8, wherein the cellular automata routines further comprise a Game of Life model.

14. The passive obstacle detection system of Claim 8, wherein the line segments are of a sub-pixel resolution.

15. A passive obstacle detection system comprising:

an infrared imaging system that acquires images; and

a software system that processes images acquired by the infrared imaging system;

wherein the software system further comprises cellular automata routines that propagate pixels along a line according to a set of local rules, thereby producing line segments that are linked and determined to be obstacles such that aircraft flight controls are automatically adjusted according to the obstacles.

16. A passive obstacle detection system comprising:

an infrared imaging system that acquires images;

a software system that processes images acquired by the infrared imaging system; and

a passive ranging system in communication with the software system,

wherein the software system further comprises cellular automata routines that propagate pixels along a line according to a set of local rules, thereby producing line segments that are linked and determined to be obstacles such that the passive ranging system assigns a range to the obstacles to reduce the probability of false alarms.

17. The passive obstacle detection system of Claim 16, wherein the passive ranging system further comprises an optical flow field to indicate whether the obstacle is approaching or moving away from the passive obstacle detection system.

18. A method for detection of obstacles, the method comprising the steps of:

(a) generating a field of direction vectors for pixels acquired by an imaging system;

(b) propagating the pixels along a line using cellular automata techniques to produce line segments;

(c) linking the line segments; and

(d) presenting the linked line segments as obstacles.

19. The method of Claim 18, wherein the step of generating a field of direction vectors further comprises determining partial directional derivatives of pixels within the images.

20. The method of Claim 18, wherein the step of generating a field of direction vectors further comprises generating a vertical mask and a horizontal mask to form a magnitude image.

21. The method of Claim 18 wherein the step of generating a field of direction vectors further comprises generating pseudo colors that are indicative of direction.

22. The method of Claim 18, wherein the cellular automata techniques further comprise a Game of Life model.

23. A method for detection of obstacles, the method comprising the steps of:

(a) generating a field of direction vectors for pixels acquired by an imaging system;

(b) propagating the pixels along a line using cellular automata techniques to produce line segments;

(e) linking the line segments;

(f) presenting the linked line segments as obstacles; and

(g) assigning a range to the obstacles to reduce the probability of false alarms.

24. The method of Claim 23 further comprising the step of generating an optical flow field to indicate whether the obstacle is approaching or moving away.